

## Tuberculosis in Arizona, 2001

### Morbidity

There were 15,991 cases of active tuberculosis (TB) reported in the United States (U.S.) in 2001. Of these, 289 occurred in Arizona. While the U.S. has seen nine years of decline in the number of cases and case rates since 1993, this trend is not apparent in Arizona (Table 1 and Figure 1). The mean number of TB cases in Arizona from 1992 to 2001 was 269 with a minimum of 228 cases in 1993 and maximum of 317 cases in 1995. Due to population growth statewide, TB case rates declined from 6.7 in 1992 to 5.1 in 2000. However, in 2001 the TB case rate increased to 5.4. While the Arizona TB rate now approximates the national rate of 5.6 per 100,000 persons, it is higher than the Healthy People 2010 target rate of 1.0 per 100,000 persons (Figure 1). Only three states have met or exceeded the 2010 target goal. Arizona ranked 17 nationwide in TB case rates and 14 in number of cases in 2001. The majority of TB cases in Arizona in 2001 were of Hispanic or Latino ethnicity (45.7%), followed by White, non-Hispanic (25.3%), Native American (15.9%), Asian (8.3%) and Black, non-Hispanic (4.8%). The mean age was 43.9 years, the median age 44 years and 66.4% were male (Table 2).

**Table 1. Tuberculosis Cases and Case Rates per 100,000 Population, Arizona and United States, 1992 - 2001**

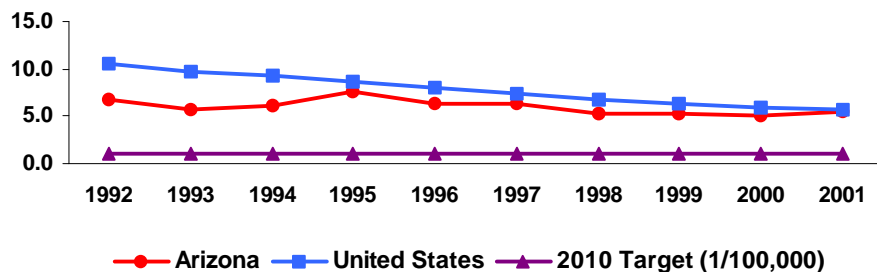
Year <sup>b</sup>	Arizona			United States <sup>a</sup>	
	Cases	Population <sup>c</sup>	Rate	Cases	Rate
1992	258	3,858,825	6.7	26,673	10.5
1993	228	3,946,975	5.8	25,287	9.8
1994	247	4,036,875	6.1	24,361	9.4
1995	317	4,184,723	7.6	22,860	8.7
1996	282	4,462,717	6.3	21,337	8.0
1997	296	4,595,379	6.4	19,851	7.4
1998	254	4,722,097	5.4	18,361	6.8
1999	262	4,924,350	5.3	17,531	6.4
2000	261	5,130,632	5.1	16,377	5.8
2001	289	5,307,331	5.4	15,989	5.6

<sup>a</sup>Data from U.S. Department of Health and Human Services; Centers for Disease Control and Prevention, available at: [www.cdc.gov/nchstp/tb/](http://www.cdc.gov/nchstp/tb/)

<sup>b</sup>Year reported reflects the year case was verified by Arizona Department of Health Services.

<sup>c</sup>Denominators for computing 2001 rates are from the Arizona Department of Economic Security (<http://www.hs.state.az.us/plan/pd01.htm>). Year 2000 denominators are from the 2000 U.S. Census. Population projections from Arizona Department of Economic Security are used for years prior to 2000.

**Figure 1. Tuberculosis Case Rates per 100,000 Population, Arizona and United States, 1992 - 2001**



**Table 2. Tuberculosis Cases by Ethnicity, Gender and Age Group, Arizona, 2001**

	Age Group						Total by Ethnicity		
	< 5	5-14	15-24	25-44	45-64	65+	No.	(%)	Rate <sup>a,b</sup>
White, Not Hispanic									
Male	0	1	2	7	19	20	49		
Female	0	0	5	6	8	5	24		
Total	0	1	7	13	27	25	73	(25.3)	2.2
Black, Not Hispanic									
Male	0	0	3	3	3	1	10		
Female	0	1	1	2	0	0	4		
Total	0	1	4	5	3	1	14	(4.8)	8.5
Hispanic or Latino <sup>c</sup>									
Male	5	3	17	31	23	8	87		
Female	7	4	8	12	7	7	45		
Total	12	7	25	43	30	15	132	(45.7)	9.8
Native American <sup>d</sup>									
Male	2	0	0	12	7	11	32		
Female	0	0	1	2	7	4	14		
Total	2	0	1	14	14	15	46	(15.9)	17.4
Asian <sup>e</sup>									
Male	0	0	2	7	5	0	14		
Female	0	0	1	6	2	1	10		
Total	0	0	3	13	7	1	24	(8.3)	23.4
Total by Gender									
Male	7	4	24	60	57	40	192	(66.4)	7.2
Female	7	5	16	28	24	17	97	(33.6)	3.6
Total by Age Group									
No.	14	9	40	88	81	57	289		
(%)	(4.8)	(3.1)	(13.8)	(30.4)	(28.0)	(19.7)		(100.0)	
Rate <sup>a,b</sup>	3.5	1.1	5.3	5.6	7.3	8.2			5.4

<sup>a</sup>Rate per 100,000 population.

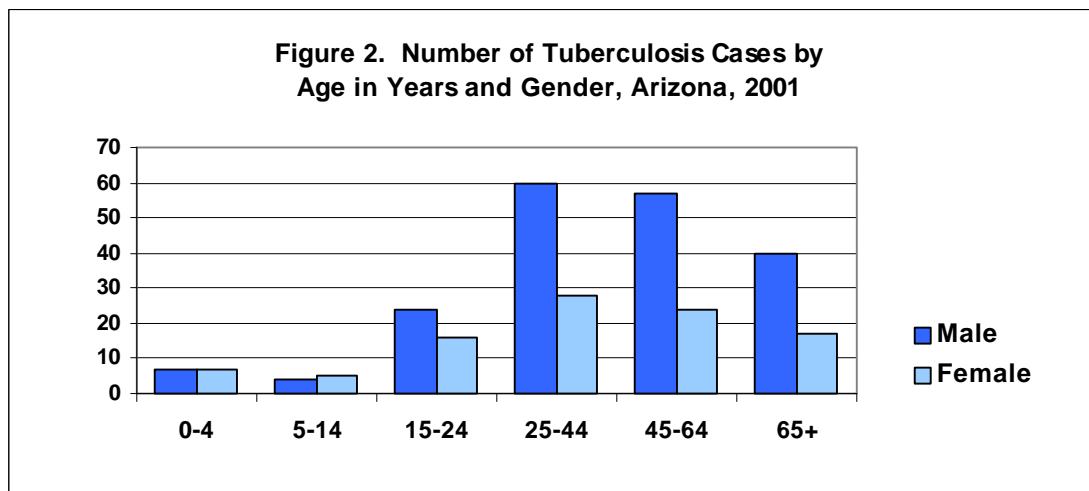
<sup>b</sup>Denominators for computing rates are from the 2000 U.S. Census in order to have population breakdowns by age group and gender.

<sup>c</sup>Persons of Hispanic or Latino origin may be of any race.

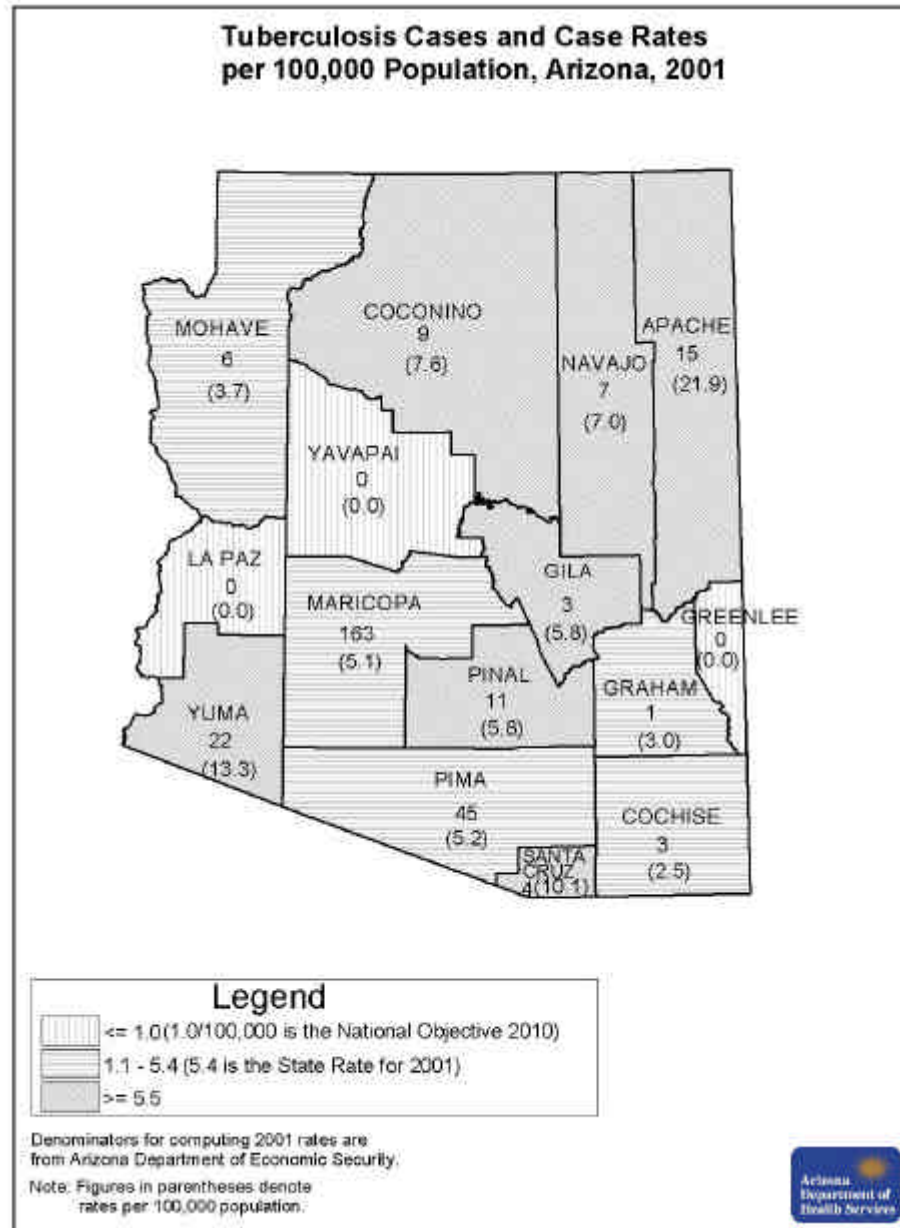
<sup>d</sup>Includes American Indians and Native Alaskans.

<sup>e</sup>Includes Native Hawaiians and Other Pacific Islanders.

The greatest proportion of male (31.3%) and female (28.9%) cases were in the 25-44 year age group (Figure 2), followed by the 45-64 year group (29.7% and 24.7% respectively), greater than 65 years (20.8% and 17.5%), 15-24 years (12.5% and 16.5%), less than 5 years (3.6% and 7.2%) and 5-14 years (2.1% and 5.2%). There were almost twice as many male cases (192) as female cases (97). The mean age of male cases was 45.8 years and the mean age of female cases was 40.2 years.

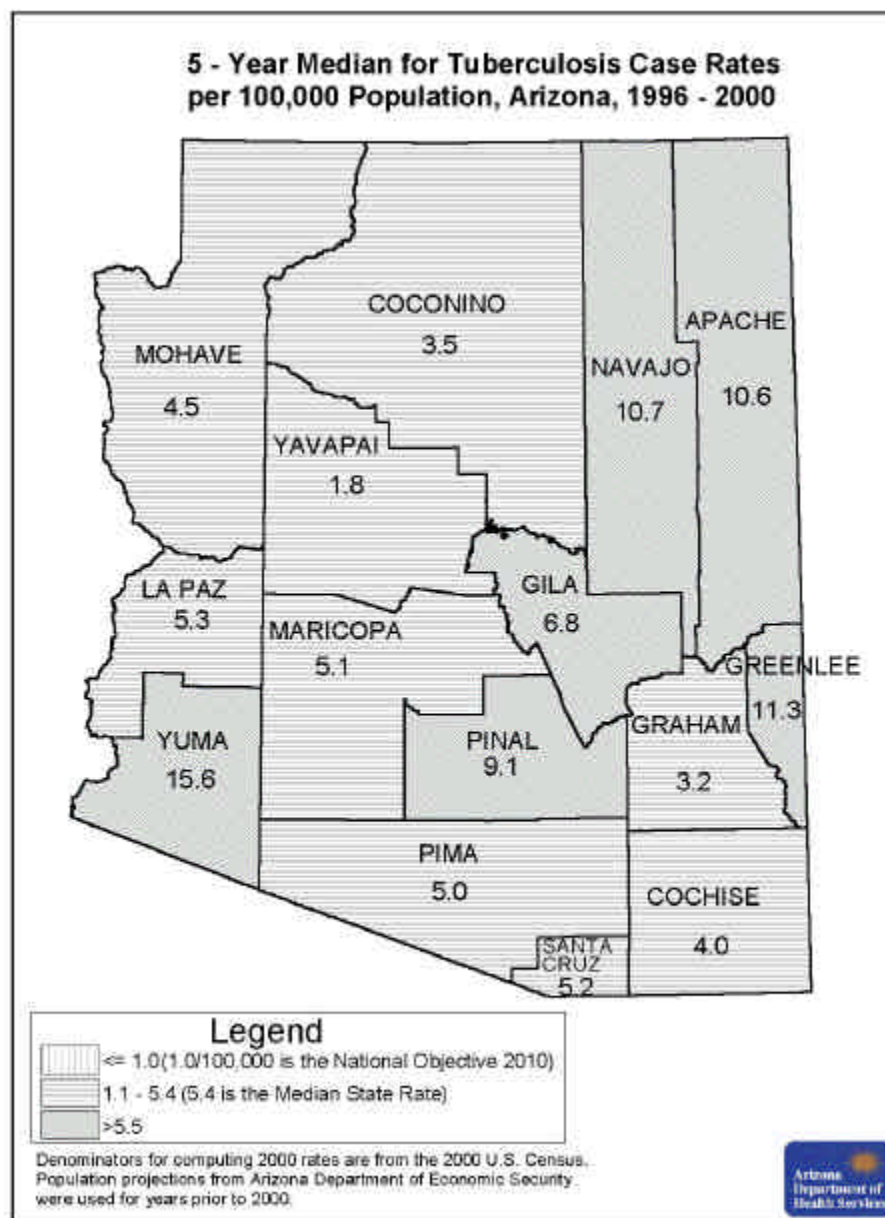


Four of Arizona's 15 counties, Maricopa, Pima, Yuma and Apache, accounted for 85% of the state's TB cases. Maricopa County, which includes Phoenix, the sixth largest city and the fourteenth largest metropolitan area in the U.S., led the state with 163 cases (56.4%). Pima County, a U.S.-Mexico border county that includes Arizona's second largest urban area, Tucson, was second with 45 cases (15.6%). Yuma County, also on the U.S.-Mexico border, had 22 cases (7.6%). Apache County, a largely rural area, had 15 cases (5.2%), three times the 5 cases reported in 2000. Pinal County, which contains Arizona's two largest state prison facilities, three private prisons, an INS processing center, and a county jail had 11 cases (3.8%); of these, 9 were diagnosed in correctional facilities. Three of the remaining ten counties, Greenlee, La Paz and Yavapai, reported no TB cases in 2001 (Figure 3).



**Figure 3. Tuberculosis Cases and Case Rates per 100,000 (in parentheses) by County, Arizona, 2001.**

Yuma County had the highest 5-year median rate (15.6 per 100,000 population) of the 15 counties. Greenlee County was second with a 5-year median rate of 11.3 per 100,000 population. However, this rate is not statistically reliable due to the small number of cases and the small population sizes in Greenlee and other rural counties. In this situation, an increase of only one or two cases will result in a dramatic rate increase. This accounts for some of the rate fluctuations from year to year in counties with small populations. In general, reported rates involving less than 10 cases are not reliable (Figure 4).



**Figure 4. Five-Year Median Tuberculosis Case Rates per 100,000 by County, Arizona, 1996-2000**

### **Risk Factors**

Arizona has observed an increasing proportion of cases among the foreign-born, the same trend as seen nationally. In 2000, 56.7% of Arizona cases were born outside the U.S., marking the first year that foreign-born cases outnumbered those born in the U.S. (Table 3). In 2001, almost half (46.0%) of Arizona cases were born outside the U.S. and its territories (Figure 5). The majority (61.73%) of foreign-born persons with TB in Arizona in 2001 were born in Mexico (n=82). Other reported countries of origin

include the Philippines, 6.8% (n=9), Vietnam, 4.5% (n=6), India, 3.8% (n=5) and El Salvador, 2.3% (n=3).

The remaining 28 cases are from 22 other countries with 2 cases or less per country (Figure 6).

**Table 3. Tuberculosis Cases by Selected Risk Factors, Arizona, 1996 - 2001**

	1996		1997		1998		1999		2000		2001	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)
Occupation												
Correctional Facility Worker	0	(0.0)	0	(0.0)	1	(0.4)	0	(0.0)	0	(0.0)	0	(0.0)
Health Care Worker	2	(0.7)	3	(1.0)	3	(1.2)	1	(0.4)	6	(2.3)	5	(1.7)
Migrant Farm Worker	9	(3.2)	2	(0.7)	5	(2.0)	6	(2.3)	9	(3.4)	6	(2.1)
Reported Behaviors												
Injecting Drug Use <sup>a</sup>	12	(4.3)	11	(3.7)	6	(2.4)	10	(3.8)	11	(4.2)	11	(3.8)
Non-injecting Drug Use <sup>a</sup>	13	(4.6)	15	(5.1)	10	(3.9)	20	(7.6)	20	(7.7)	22	(7.6)
Excess Alcohol Use <sup>a</sup>	37	(13.1)	48	(16.2)	39	(15.4)	55	(21.0)	46	(17.6)	60	(20.8)
Type of Residence												
Long Term Care Facility <sup>b</sup>	14	(5.0)	12	(4.1)	4	(1.6)	7	(2.7)	7	(2.7)	12	(4.2)
Correctional Facility <sup>b</sup>	18	(6.4)	23	(7.8)	14	(5.5)	18	(6.9)	21	(8.0)	16	(5.5)
Homeless <sup>a</sup>	35	(12.4)	29	(9.8)	29	(11.4)	36	(13.7)	38	(14.6)	45	(15.6)
Country of Birth												
Foreign Born <sup>c</sup>	108	(38.3)	111	(37.5)	102	(40.2)	111	(42.4)	148	(56.7)	133	(46.0)
Underlying Disease												
HIV infection, All Ages <sup>d</sup>	15	(5.3)	12	(4.1)	14	(5.5)	16	(6.1)	18	(6.9)	12	(4.2)
HIV infection, 25-44 Years Old <sup>d</sup>	11	(12.9)	10	(10.4)	11	(15.9)	10	(10.1)	13	(14.3)	8	(9.1)
Total Cases	282		296		254		262		261		289	

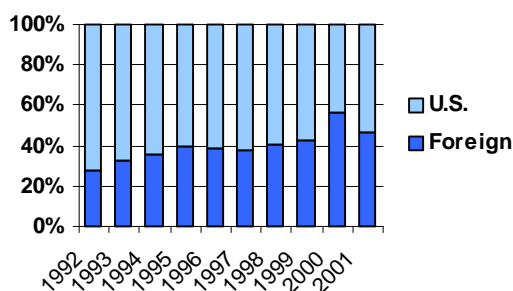
<sup>a</sup>Within one year prior to diagnosis of tuberculosis.

<sup>b</sup>Residence at time of diagnosis.

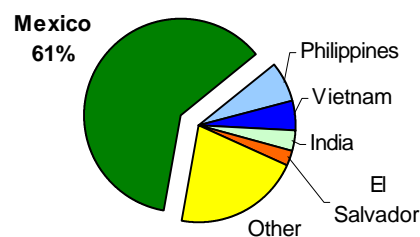
<sup>c</sup>Includes persons born outside the United States and its territories.

<sup>d</sup>Tuberculosis cases with a reported positive HIV test result. The percent positive represents HIV co-infection among all verified TB cases, including those not tested for HIV infection.

**Figure 5. Foreign-Born TB Cases, Arizona, 1992 - 2001**



**Figure 6. Reported Country of Birth, Arizona TB Cases, 2001**

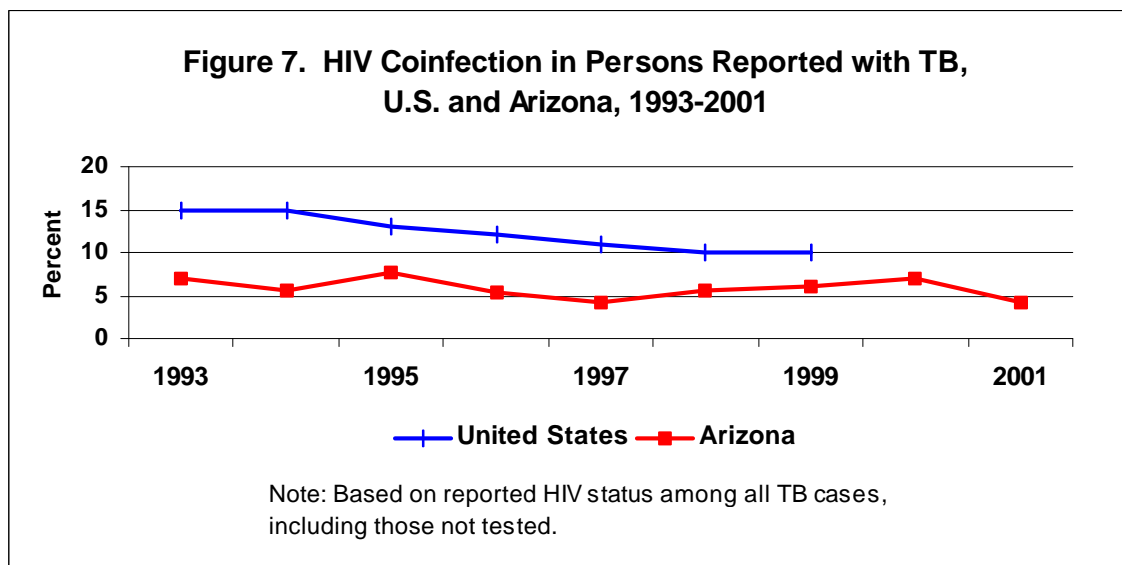


Excess alcohol use has been increasingly reported among TB cases in Arizona, up from 13.1% in 1996 to 20.8% in 2001. In 2000, excess alcohol use was reported in 17.6% of Arizona cases, slightly higher than the national average of 15% for that year.

Homelessness is another important risk factor for TB in Arizona with the proportion of TB cases among homeless persons in 2000 2.4 times higher than the national average of 6.1%. The proportion of TB cases among homeless persons in Arizona increased in 2001 to 15.6%.

In 2001, the proportion of TB cases diagnosed in Arizona correctional facilities was 5.5% (n=16), down slightly from 8.0% (n=21) of reported cases in 2000. In contrast, only 3.6% of TB cases nationally were reported as diagnosed in correctional facilities in 2000. The greatest challenge among the correctional facility cases in Arizona has been in providing adequate treatment for Immigration and Naturalization Service (INS) detainees diagnosed with TB while in custody (n=11 in 2001 versus n=15 in 2000). Most detainees are deported prior to completion of treatment and may even be deported prior to culture results. In these cases, the detainee is unaware of their diagnosis of TB. In 2000, Arizona's TB Control Program began actively enrolling every TB suspect who is in INS custody in the bi-national TB referral program, CURE-TB, offered by the San Diego TB Control Program. This enables detainees and their providers access to their medical information following deportation.

Nationally, the proportion of TB cases known to be co-infected with HIV has been declining, from 15% in 1993 to 10% in 1999, while remaining approximately stable in Arizona at 7% in 1993 and 6% in 1999. During these years, the proportion of TB cases for which HIV results are known has increased much more in Arizona (from 18% to 60%) than nationally (30% to 48%). In 2001, HIV test results are known for 64% of TB cases in Arizona among all age groups and for 82% of those in the 25-44 year age group, considered to be at highest risk for HIV co-infection (Table 4). The proportion of TB cases known to be co-infected with HIV in Arizona decreased from 7% in 2000 to 4% in 2001 (Figure 7).



**Table 4. Proportion of Reported Tuberculosis Cases with HIV Test Results and HIV Coinfection by Age Group, U.S. and Arizona, 1993-2001.**

Year	25-44 Years Old				All Ages			
	HIV Test Results Known <sup>a</sup>		HIV Positive <sup>b</sup>		HIV Test Results Known <sup>a</sup>		HIV Positive <sup>b</sup>	
	U.S. (%)	AZ (%)	U.S. (%)	AZ (%)	U.S. (%)	AZ (%)	U.S. (%)	AZ (%)
1993	(46)	(38)	(29)	(19)	(30)	(18)	(15)	(7)
1994	(49)	(28)	(29)	(15)	(33)	(16)	(15)	(6)
1995	(52)	(53)	(26)	(19)	(36)	(33)	(13)	(8)
1996	(57)	(65)	(25)	(13)	(41)	(44)	(12)	(5)
1997	(60)	(69)	(21)	(10)	(44)	(45)	(11)	(4)
1998	(61)	(77)	(20)	(16)	(45)	(47)	(10)	(6)
1999	(62)	(84)	(19)	(10)	(48)	(60)	(10)	(6)
2000		(74)		(14)		(62)		(7)
2001		(82)		(9)		(64)		(4)

<sup>a</sup>Rhode Island reported HIV test results in 1998 and 1999. California reporting of HIV status is incomplete and only includes persons also reported with AIDS. Includes cases with positive, negative and indeterminate HIV test results.

<sup>b</sup>Based on reported HIV positive status among all reported tuberculosis cases, including those not tested.



## Drug susceptibility

Initial drug susceptibility testing was obtained on 98% (224/228) of culture-proven TB cases in Arizona in 2001. Overall, drug resistance patterns have not changed significantly in recent years. All multi-drug resistant cases since 1998 have occurred among foreign-born persons (Table 5).

**Table 5. Drug Resistance Among U.S.-born and Foreign-born Tuberculosis Cases, Arizona, 1996-2001**

Year	INH Resistance <sup>a,b</sup>						Multi-Drug Resistant <sup>a,c</sup>						Other Drug Resistance <sup>a,d</sup>					
	U.S.-born		Foreign-born		Total <sup>e</sup>		U.S.-born		Foreign-born		Total <sup>e</sup>		U.S.-born		Foreign-born		Total <sup>e</sup>	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)
1996	1	(1)	5	(6)	6	(3)	2	(1)	5	(6)	7	(3)	19	(13)	4	(5)	23	(10)
1997	8	(6)	10	(12)	18	(8)	1	(1)	1	(1)	2	(1)	17	(12)	5	(6)	22	(10)
1998	6	(5)	4	(5)	10	(5)	0	(0)	1	(1)	1	(0)	10	(8)	4	(5)	14	(7)
1999	2	(2)	4	(4)	6	(3)	0	(0)	2	(2)	2	(1)	18	(14)	9	(9)	27	(12)
2000	2	(2)	13	(10)	15	(7)	0	(0)	2	(2)	2	(1)	10	(11)	9	(7)	19	(9)
2001	4	(3)	5	(5)	9	(4)	0	(0)	3	(3)	3	(1)	9	(8)	10	(10)	19	(8)

<sup>a</sup>More than 95% of isolates had susceptibility testing performed.

<sup>b</sup>Resistance to at least isoniazid without rifampin resistance.

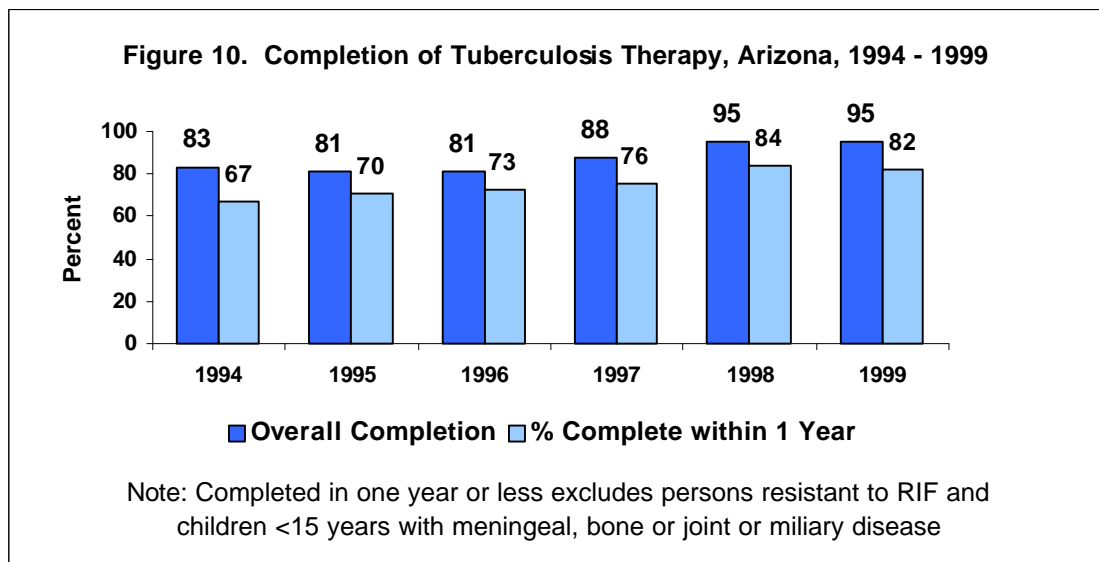
<sup>c</sup>Resistance to at least isoniazid and rifampin (multi-drug resistance).

<sup>d</sup>Other drug resistance without isoniazid resistance.

<sup>e</sup>Includes persons of unknown country of birth.

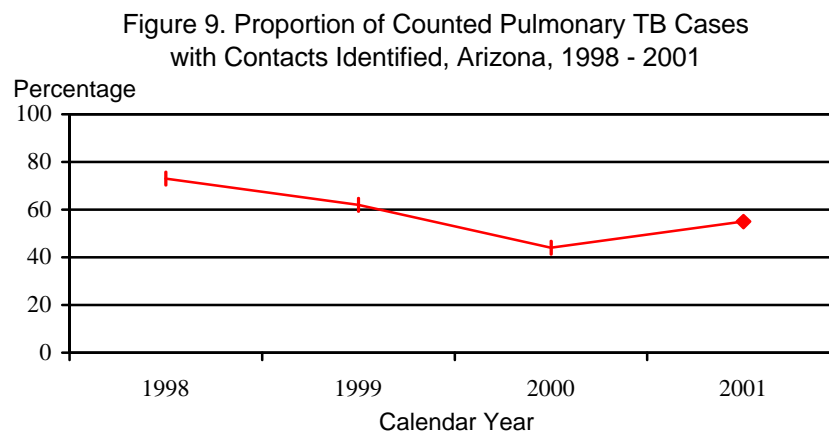
## Completion of Tuberculosis Therapy

While completion of therapy data is not available for 2000 and 2001, there has been a consistent trend of increasing rates of therapy completion in Arizona from 1994 to 1999. In cases diagnosed in 1994, 83% completed therapy and in cases diagnosed in 1998, 95% completed therapy. Nationally, the overall completion of therapy rate was 90% in 1998 (the last year for which national data is available). In 1999, Arizona had a 95% overall completion of therapy rate. In Arizona, rates for completing therapy within one year increased from 67% in 1994 to 82% in 1999, still short of the national objective of 90% (Figure 8). In 1998, 84% of Arizona cases completed therapy within one year versus 79% nationally.

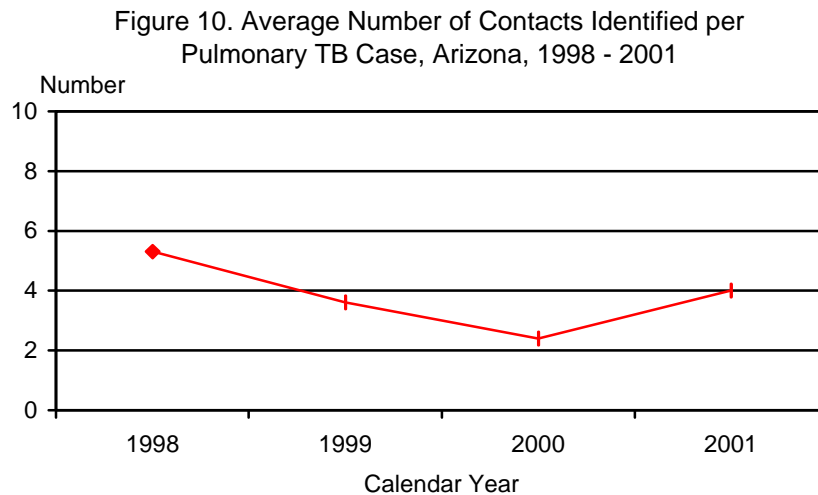


## Contacts

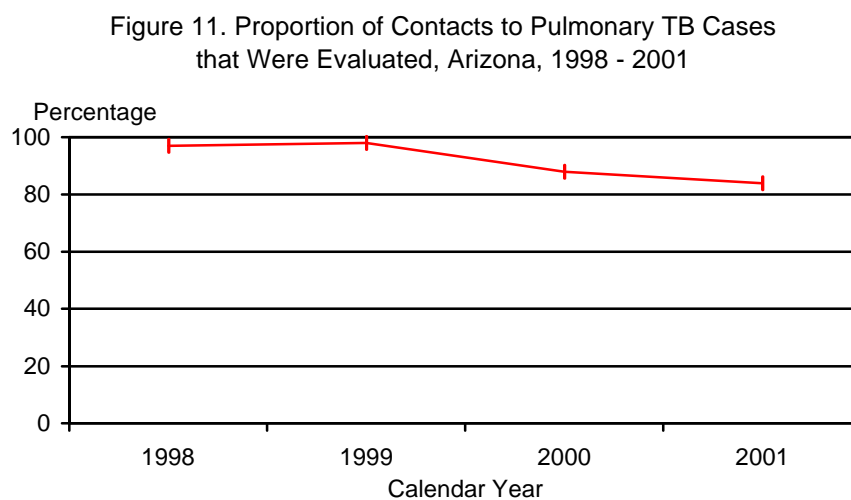
Provisionally, contacts were reported for 55% (134/244) of pulmonary TB cases in Arizona in 2001 (Figure 9). The decrease in reported contacts of pulmonary TB cases in 2000 may in part be related to the introduction of new reporting forms and categories by the Centers for Disease Control and Prevention (CDC) to reporting sources. In addition, a new computerized TB Prevention Registry that utilized the new reporting format was introduced to local health departments in 2000.



In 2001, the average number of contacts identified per pulmonary TB case in Arizona was 4.0 (964/244). This is an increase from an average of 2.4 (556/236) contacts per pulmonary TB case in 2000 (Figure 10).

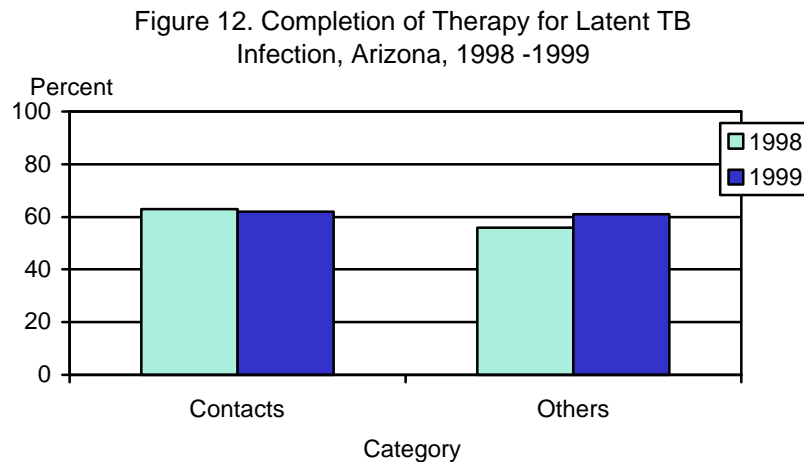


Nineteen percent (154/813) of contacts who were evaluated were found to have newly recognized latent TB infections and 0.2 percent (2/813) were found to have newly recognized active TB disease. Eighty-four percent (813/964) of contacts completed the evaluation process, a decrease from 88% (491/556) in 2000 (Figure 11).



### Completion of Therapy for Latent TB Infection

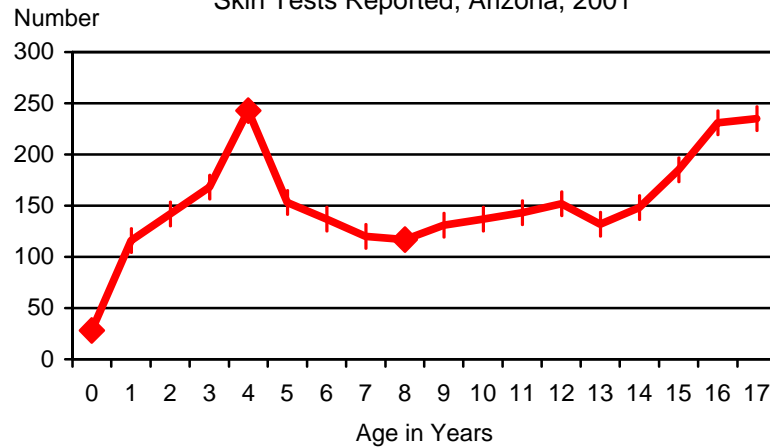
In 1999, the last year for which Arizona data is complete, 62% (114/185) of contacts to TB cases and 61% (1694/2793) of others (who were not contacts to TB cases) with positive skin tests who started therapy for latent TB infection completed therapy (Figure 12). Both are below the National Goals (85% and 75%, respectively).



### TB Skin Testing in Children

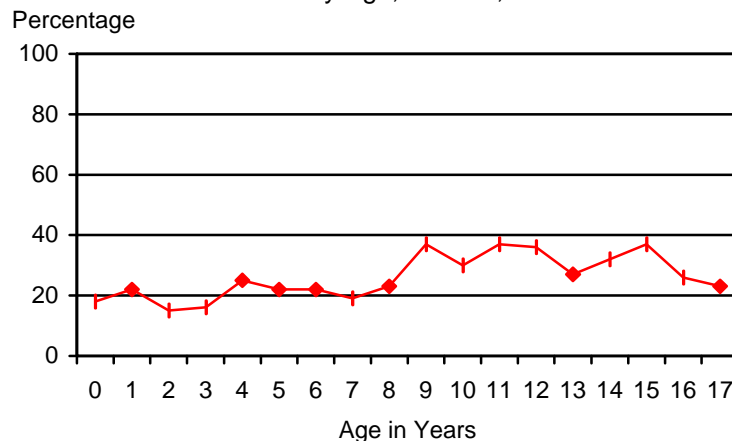
Provisionally, completed skin tests were reported for 2,718 children (under 18 years of age) in Arizona in 2001. Forty-five percent (1211/2718) were tested as part of local health department skin test screening activities; 17% (470/2718) as part of immigration evaluation; and 16% (425/2718) as part of contact investigations. Data show peaks in skin testing at age 4 years (n=243) and age 17 years (n=235) (Figure 13). It is unclear why there are a greater number of completed skin tests at these ages; it may be due to school entry and volunteer or work requirements.

Figure 13. Number of Children with Completed TB Skin Tests Reported, Arizona, 2001



Overall, 26% (716/2718) of children who completed skin testing had positive TB skin tests reported. Of children who completed testing as part of local health department screening activities, 32% (384/1211) had positive TB skin tests. Of children who completed testing during immigration evaluation, 23% (108/470) had positive TB skin tests. Of children who completed testing as part of a contact investigation, 11% (48/425) had positive TB skin tests. Skin tests were more likely to have positive results among children age 9 years or older versus children age 8 years or less (Figure 14).

Figure 14. Proportion of Children With Positive TB Skin Tests by Age, Arizona, 2001



The *Tuberculosis Surveillance Report* is published annually by the Arizona Department of Health Services, TB Control Section. All data are provisional. Report finalized 4/18/2002 based on available data as of 3/11/2002.